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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/031,445	01/22/2002	Akira Asai	740819-734	6739

7590 10/30/2003
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EXAMINER

GEBREMARIAM, SAMUEL A

ART UNIT PAPER NUMBER

2811

DATE MAILED: 10/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/031,445

Applicant(s)

ASAI ET AL.

Examiner

Samuel A Gebremariam

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 August 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 2, 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki US patent No. 5,302,841 in view Sato, JP patent No. 200058555A.

Regarding claim 1, Yamazaki teaches a bipolar transistor (col. 3, lines 14-53 and fig. 2), comprising: a first semiconductor layer to be a collector layer (4) formed on a substrate (see abstract); a second semiconductor layer to be a base layer (3) formed on the first semiconductor layer; a third semiconductor layer (2) formed on the second semiconductor layer from a material having a bandgap different from a bandgap of the second semiconductor layer (col. 2, lines 21-26); and an emitter connecting electrode (1) made of a conductor material and brought into contact with the third semiconductor layer, wherein the third semiconductor layer includes an emitter diffusion layer (5), and a peripheral layer (part of the emitter region) located at a side of the emitter diffusion layer, and the peripheral layer has an impurity distribution that is high in concentration in the upper part (see fig. 2, region 2 has high concentration on the left side) and low concentration at the center and high concentration in the lower part within the peripheral layer.

Yamazaki does not explicitly teach the first and second layers have an impurity of a first conductive type and an impurity of a second conductive type respectively. Further Yamazaki does not teach an insulator film provided on the third semiconductor layer, an opening portion formed through the insulator film to reach the third semiconductor layer and filling the opening portion in the insulator film.

It is conventional and also taught by Sato (fig. 1b) forming a first semiconductor layer (3) of first conductive type and a second semiconductor layer (9) of second conductive type. Bipolar transistors in general are either NPN or PNP, this inherently makes them have first and second conductivity type. Furthermore Sato teaches an insulator film (13) provided on the third semiconductor layer with an opening (103) formed through the insulator layer to reach the third semiconductor layer.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the insulating layer taught by Sato in the structure of Yamazaki in order to selectively diffuse ions to the emitter diffusion region.

Regarding claim 2, Yamazaki teaches substantially the entire claimed structure of claim 1 above including the insulator film (13) is formed from a silicon dioxide film doped with the impurity of the second conductive type (BSG, see English abstract of Sato); and the impurity of the second conductive type included in at least a part of the top portion of the third semiconductor layer is the impurity of the second conductive type out-diffused from the insulator film.

Regarding claim 4, Yamazaki teaches (fig. 2) substantially the entire claimed structure of claim 1 above including the impurity of the first conductive type in the

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emitter diffusion layer (5) of the third semiconductor layer is the impurity of the first conductive type out-diffused from the emitter connecting electrode (1).

Regarding claim 5, Yamazaki teaches (fig. 2) substantially the entire claimed structure of claim 1 above including the substrate is a silicon substrate (see abstract); the first semiconductor layer is a silicon layer (4); the second semiconductor layer is a SiGe layer (3); and the third semiconductor layer (2) is a silicon layer.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki, Sato and in view of Sato JP 115921.

Yamazaki teaches substantially the entire claimed structure of claim 1 above including a film (20b) provided so as to contact the third semiconductor layer (103) at a portion located outside the insulator film (13) and extend over the insulator film for functioning as a base connecting electrode (see Sato fig. 1b).

The combined structure of Yamazaki and Sato does not explicitly teach a polysilicon film doped with second type impurity where the impurity from the polysilicon film is used to dope portion of the third semiconductor layer.

The use of polysilicon film as an electrode for base in the fabrication of bipolar transistor is conventional and also taught by Sato where a base electrode (7) made of polysilicon doped with boron. Furthermore Sato teaches that dopant from the polysilicon electrode diffuses out to dope other regions of the device.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the polysilicon electrode layer taught by Sato in

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the structure of Yamazaki and use the polysilicon layer to dope the third semiconductor layer as claimed in order to eliminate separate doping steps.

Response to Arguments

3. Applicant's arguments with respect to claims 1-5 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

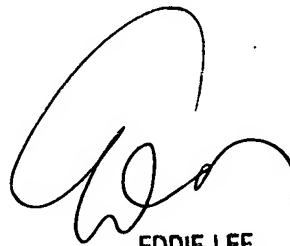
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Samuel Admassu Gebremariam whose telephone number is 703 305 1913. The examiner can normally be reached on 8:00am-4: 30pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (703) 308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 872-9306 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Samuel Admassu Gebremariam
October 21, 2003

A handwritten signature in black ink, appearing to be 'Eddie Lee', with a large, sweeping initial 'E'.

EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800